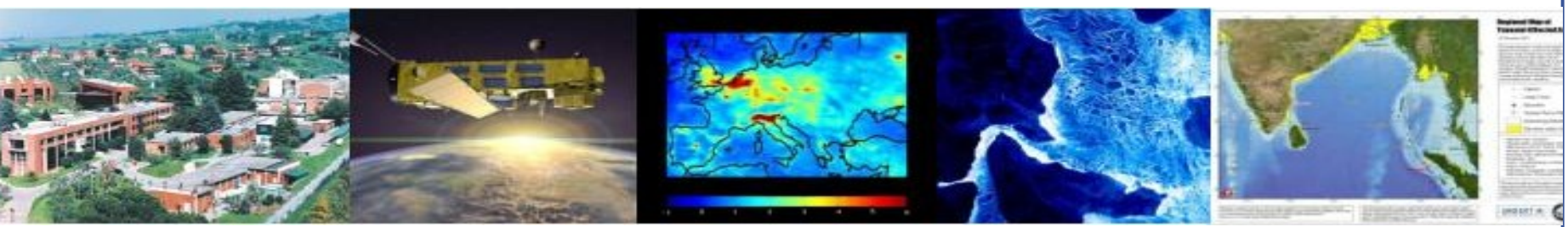
Continuity of systematic observations from space in the frame of GMES

UNFCCC COP-14 ESA-WMO side event
3 December 2008



Frank Martin Seifert

Directorate of EO Programs

European Space Agency

European Space Agency
Agence spatiale européenne

frank.martin.seifert@esa.int

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ESA, the European Space Agency, is an international organisation responsible for:

Space science, research & technology
Space applications

ESA is running:

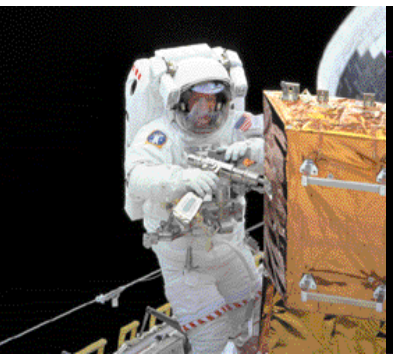
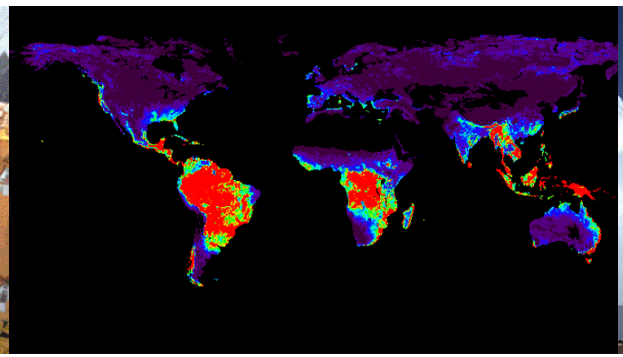
- space **activities** and programmes
- a long term **space policy**
- a specific **industrial policy**
- **coordination** with national space programmes

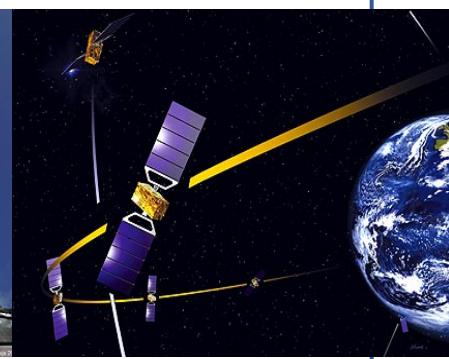
ESA member states

- **18 ESA Member States:**
  Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Norway, the Netherlands, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

- **Canada takes part in some projects under a cooperation agreement.**

- **A dedicated financial mechanism (PECS) allows East European countries to participate in ESA programs. Poland, Hungary, and Romania**



30 years experience
5 centres in Europe
2000 staff members

3 billion per year
60 satellites developed
15 missions in operation

European Space Agency
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Global Monitoring for Environment and Security (GMES)

European independence in data sources for environment and security monitoring

and

The European contribution to the Global Earth Observation System of Systems (GEOSS)

GMES

EO

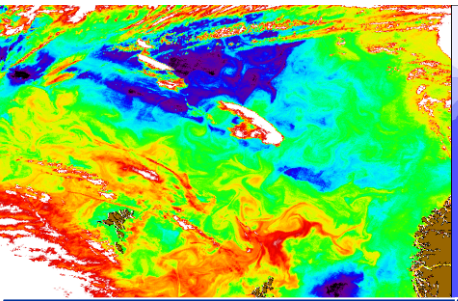
Needs

Solutions

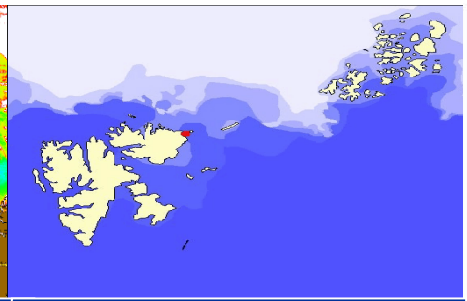
Public Policy

GMES is an EU-led initiative, in which ESA will define the technical specification and implement the Space Component and the European Commission will manage actions for identifying and developing services relying both on in-situ and remote sensing data.

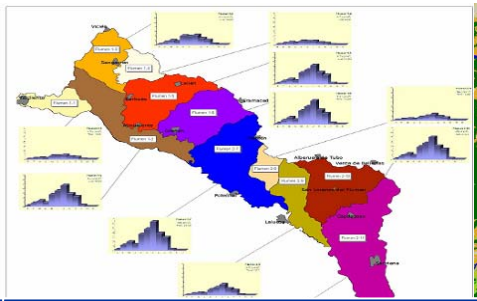
GMES Service Elements



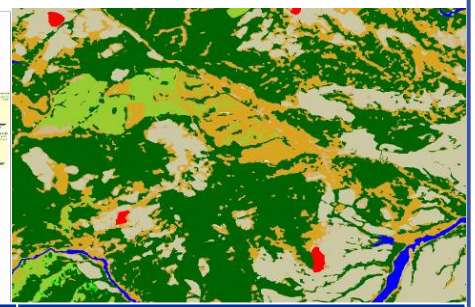
MarCoast



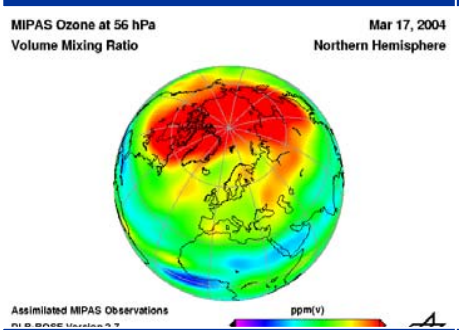
PolarView



GSE Land

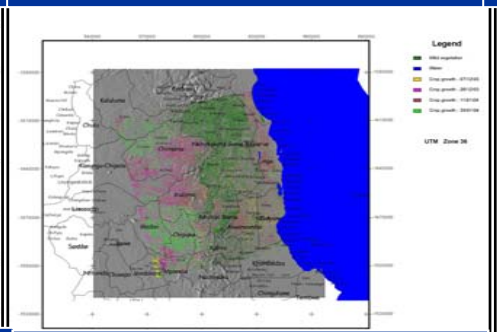


Forest Monitoring

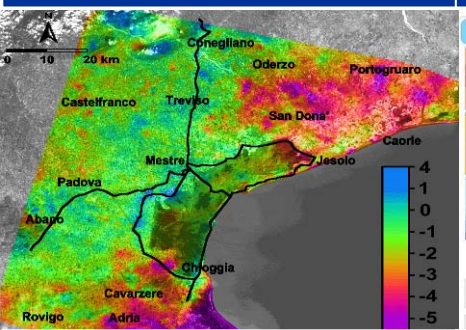


PROMOTE

RISK-EOS

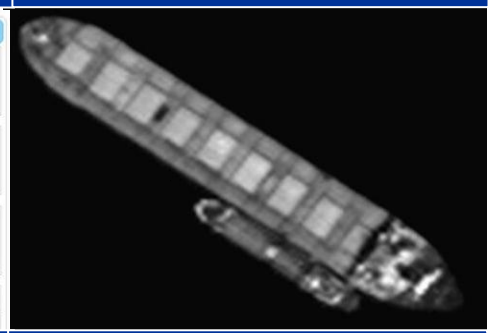


GMFS



TERRAFIRMA

RESPOND



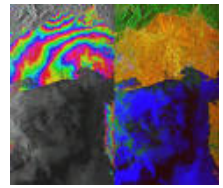
MARISS

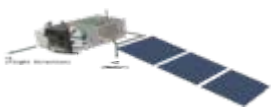
- 10 Service Elements
- 100 + 25 M€ by ESA MSs
- Period 2003 – 2009/11
- 400+ User organisations

GMES Sentinel Missions

Sentinel 1 – SAR imaging

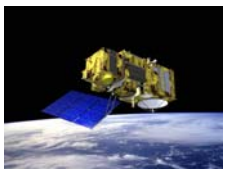
- All weather, day/night applications, interferometry, ocean / ice / land





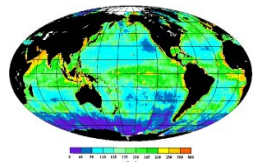
Sentinel 2 – Superspectral imaging

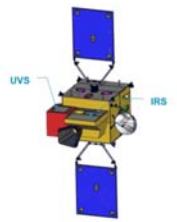
- Continuity of Landsat, SPOT - type of data for land mapping



Sentinel 3 – Ocean and Land monitoring

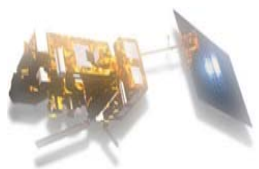
- Wide-swath ocean color, surface temperature and land mission & radar altimeter





Sentinel 4 – Geostationary atmospheric

- Atmospheric composition monitoring, trans-boundary pollution



Sentinel 5 – Low-orbit atmospheric

- Atmospheric composition monitoring

Sentinel-1

Sentinel-1:

C-band

SAR mission

Applications:

- **monitoring sea ice zones and the arctic environment**
- **surveillance of marine environment**
- **monitoring land surface motion risks**
- **mapping in support of humanitarian aid in crisis situations**

4 nominal operation modes:

- **strip map (80 km swath, 5X5 m res.)**
- **interferometric wide swath (250 km swath, 20X5 m res.)**
- **extra wide swath (400 km swath, 25X100 m res.)**
- **Wave (5X20 m res.)**

2300 Kg spacecraft mass

Sun synchronous orbit at 693 Km mean altitude

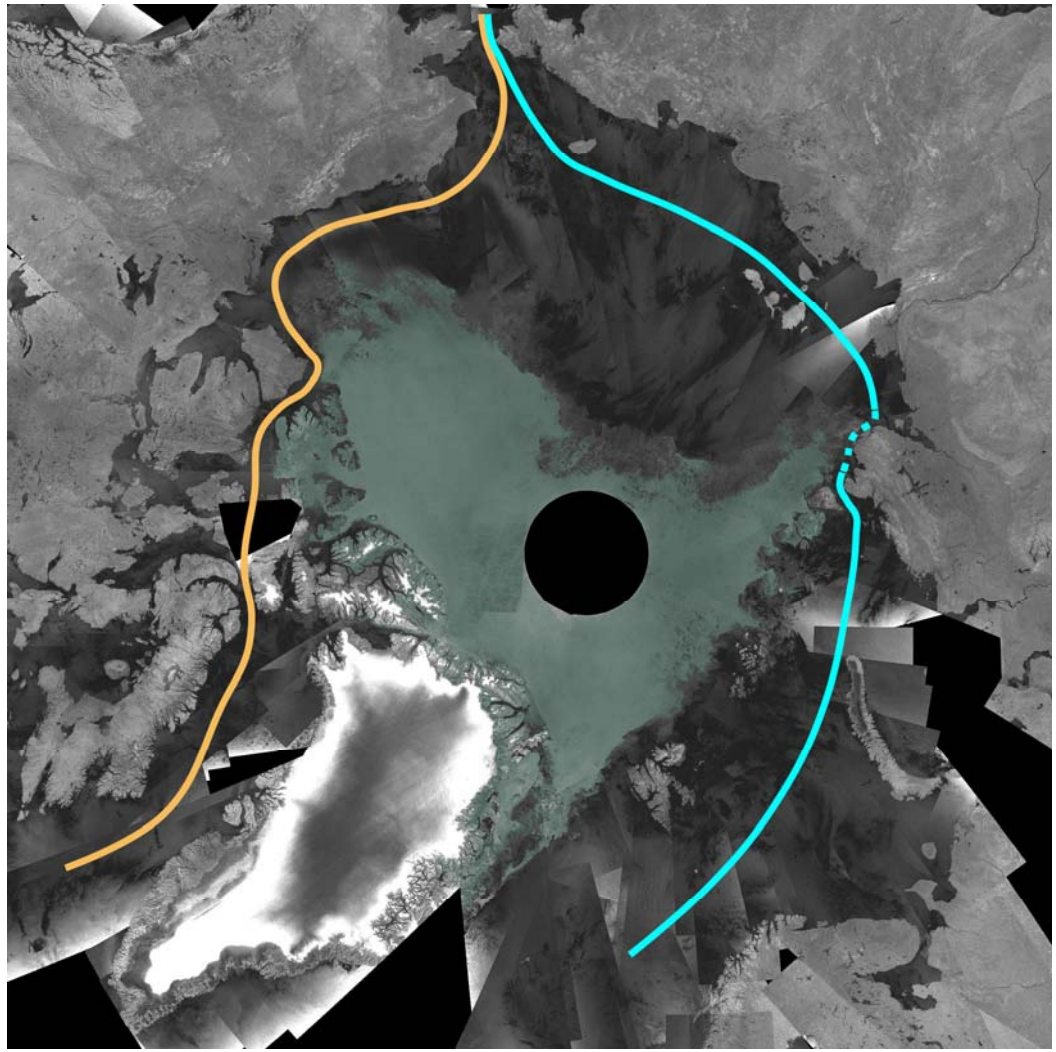
12 days repeat cycle

7 years design life time, consumables for 12 years

Lowest Arctic ice coverage in history

Northwest Passage open (orange line) and Northeast passage only partially blocked (blue line)

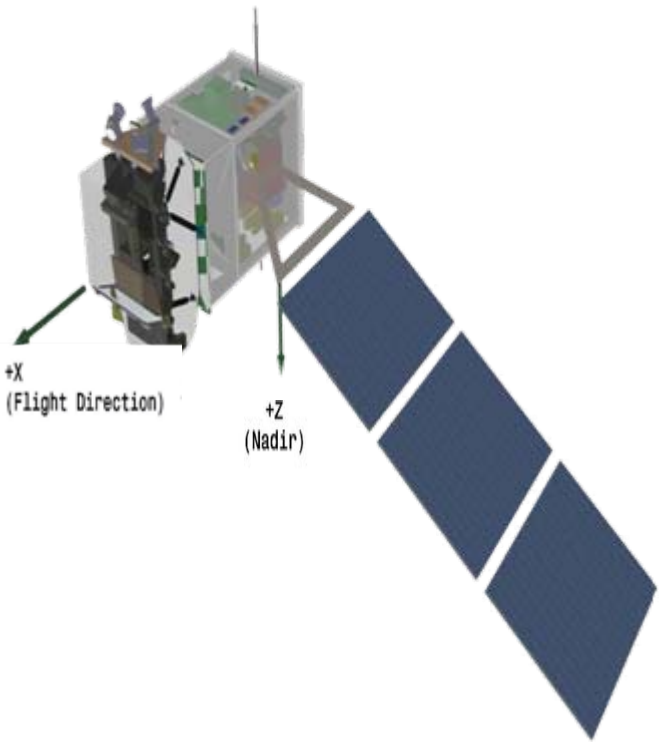
Dark grey represents ice-free areas, green represents areas with sea ice



Envisat ASAR mosaic 09/2007

Sentinel-2:

Superspectral imaging mission



Applications: • Generic land cover maps • risk mapping and fast images for disaster relief • generation of leaf coverage, leaf chlorophyll content and leaf water content
Pushbroom filter based multi spectral imager with 13 spectral bands (VNIR & SWIR)
Spatial resolution: 10, 20 and 60 m
Field of view: 290 km
1098 kg spacecraft mass
10 days repeat cycle
Sun synchronous orbit at 786 km mean altitude
7 years design life time, consumables for 12 years

REDD Pilot Projects

- Develop tools to account for national Deforestation and Degradation emissions
  - Facilitate the regional and international exchange on learning experiences
    - Identify opportunities for national incentive schemes and strengthened forest governance

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gtz

kfw ENTWICKLUNGSBANK

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REDD Issues to be tackled by EO

- **Historic Baseline Assessment (Deforestation and Degradation) and Emission Projections**
  - National coverage
  - EO combined with sample based inventories (forest inventories and biomass)
  - Land use / cover change projections and economic modelling
- **Technical Procedures – EO, Inventories, etc. to be embedded in:**
  - National and international policy framework
  - Relevant institutional frame and forest governance
  - Capacity building

Sentinel-3:

ocean & global land mission

Applications:

- **Sea/land colour data and surface temperature**
- **sea surface and land ice topography**
- **coastal zones, inland water and sea ice topography**
- **vegetation products**

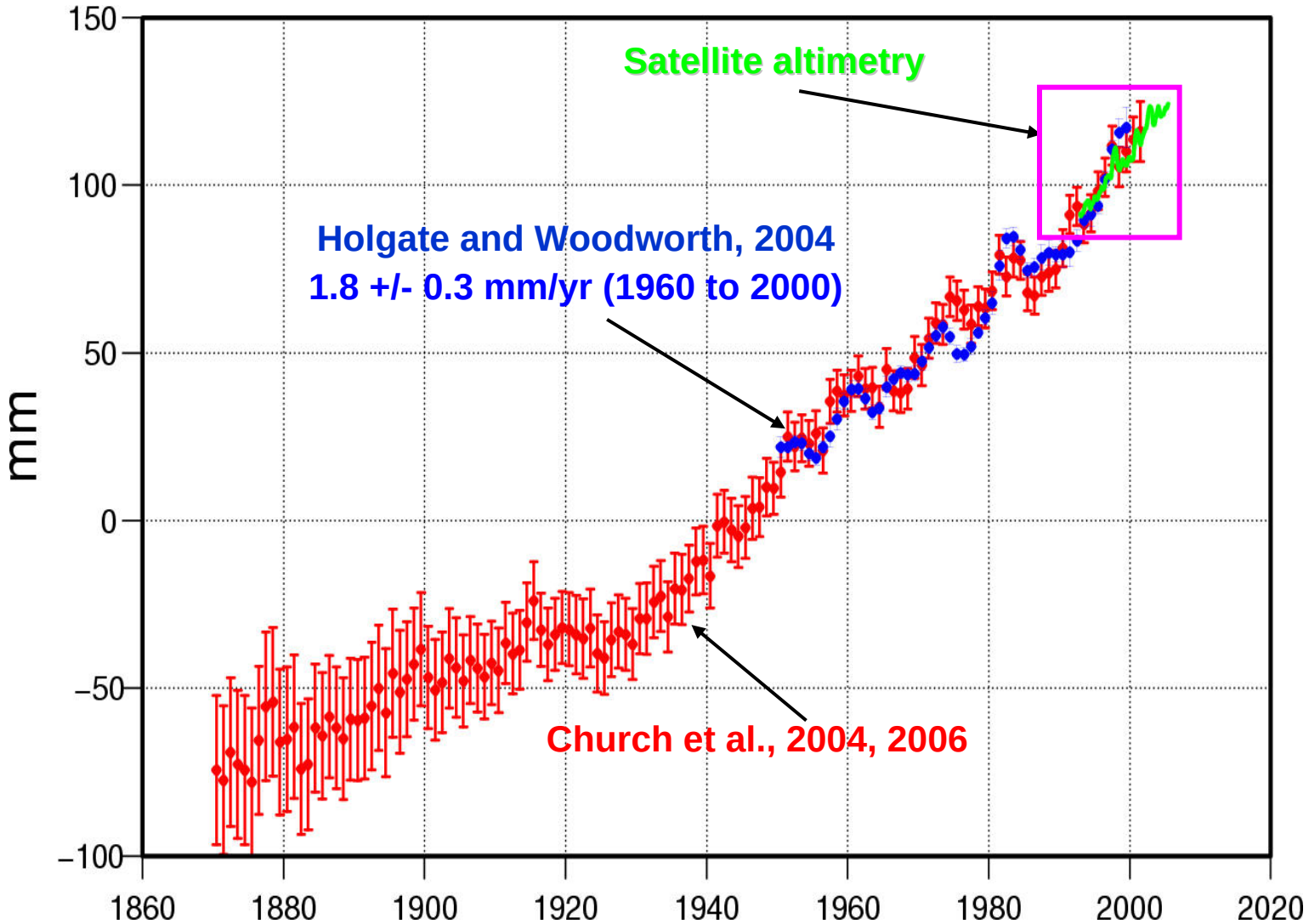
1198 kg spacecraft mass

Sun synchronous orbit at 814.5 km mean altitude over geoid

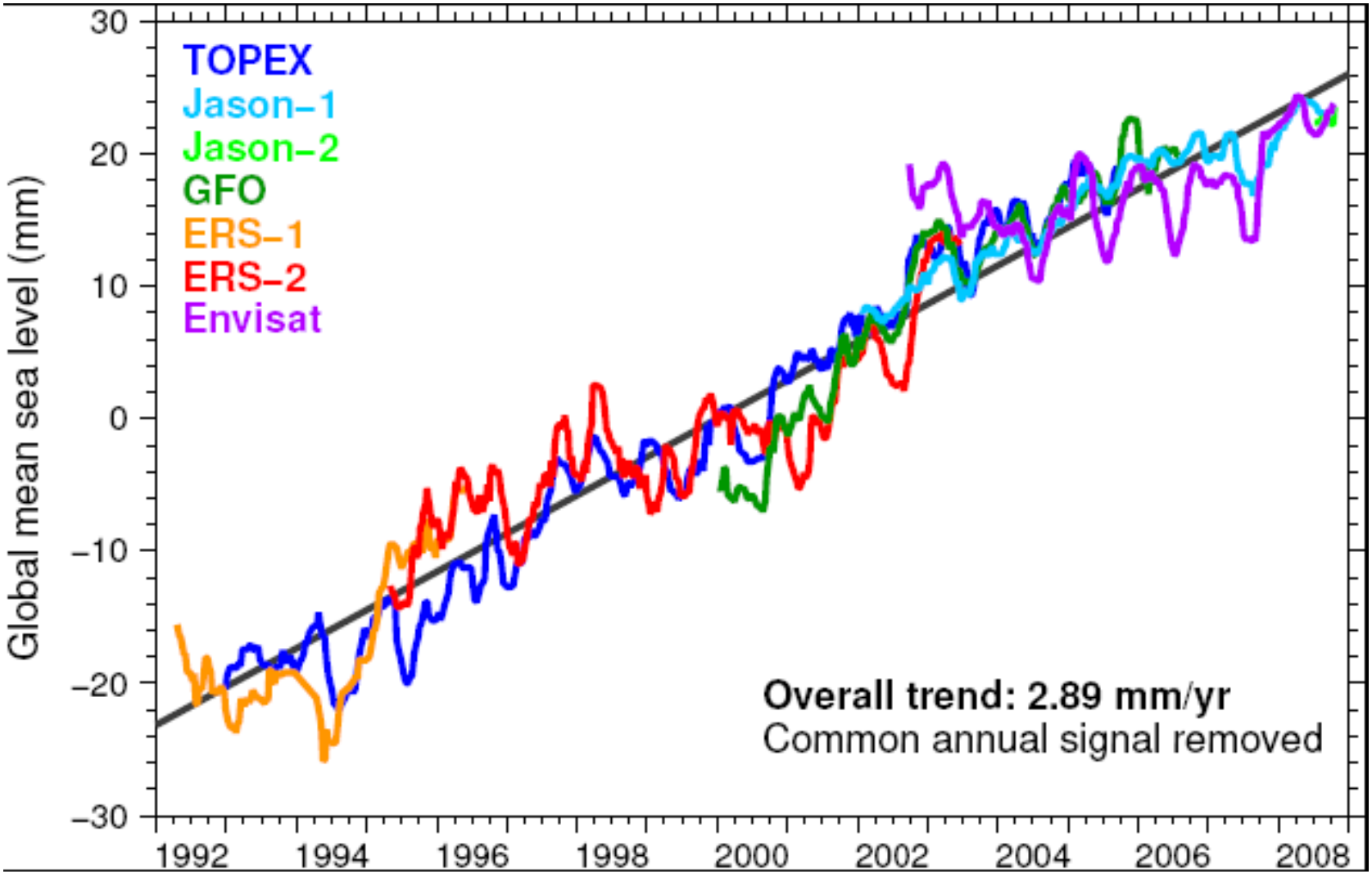
27 days repeat cycle

7 years design life time, consumables for 12 years

Global Sea Level Rise

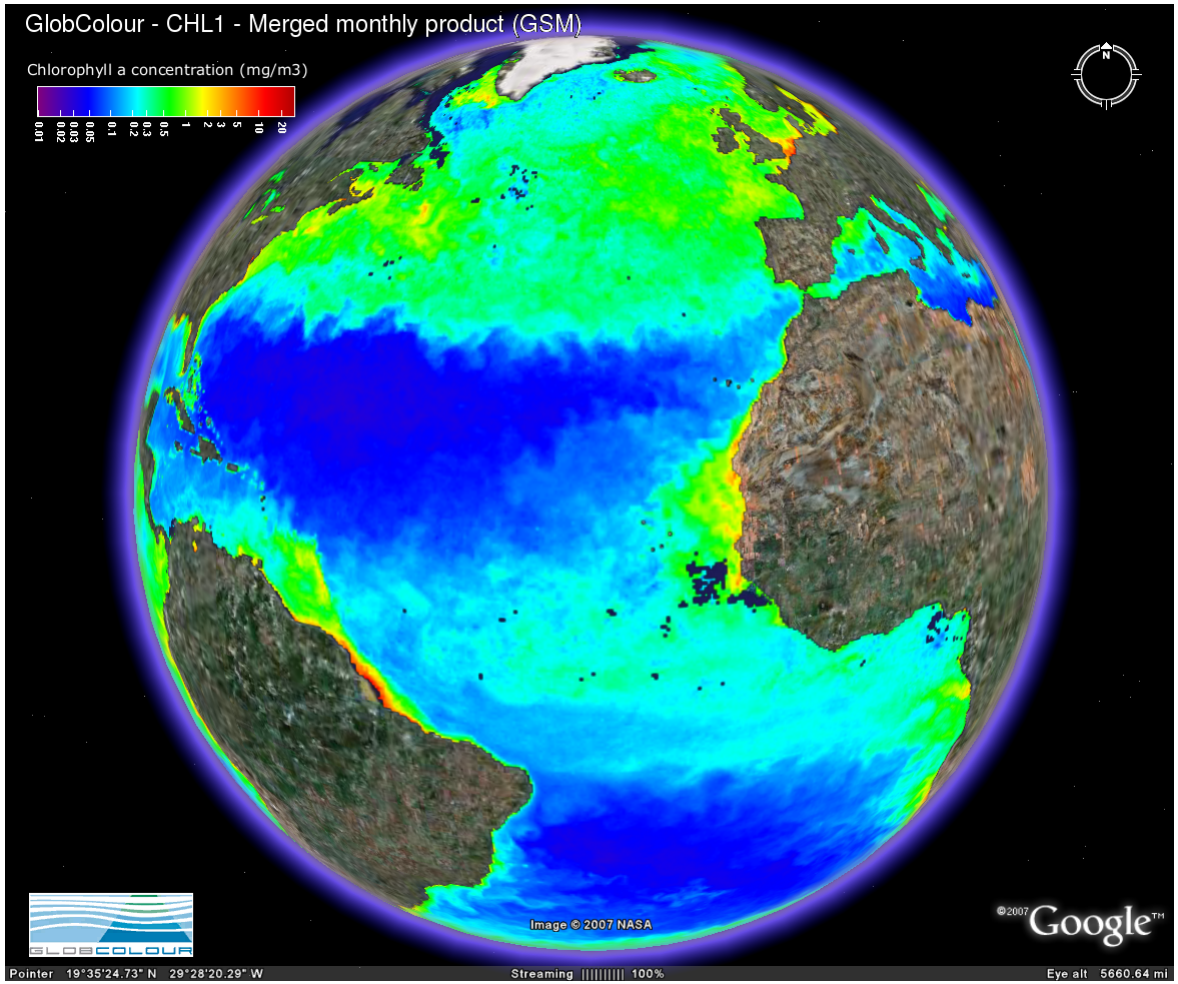


Global Sea Level Rise



O/C pre-cursor (GLOBCOLOUR project)

Global Ocean Colour for Carbon Cycle Research



ESA GlobColour Project

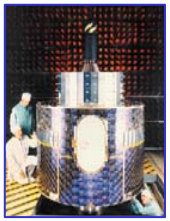
Global merged MERIS-MODIS-SeaWiFS ocean colour product (Chl_a) April 2003.

Credit: ACRI, LOV, Univ. Plymouth, ICESS, NIVA, Brockmann Consult, DLR, ESA, NASA, GeoEye

GLOBCOLOUR

www.globcolour.info

ESA Earth Observation Missions



METEOSAT Series

MSG

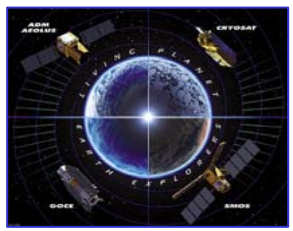
METOP

MTG

ERS-1

ERS-2

ENVISAT



CRYOSAT

SMOS

GOCE

ADM-Aeolus

Swarm

EarthCare

Sentinel-1

Sentinel-2

Sentinel-3

Sentinel-4

Sentinel-5

gmes SERVICES

70s 80s 90s 00s 2010s

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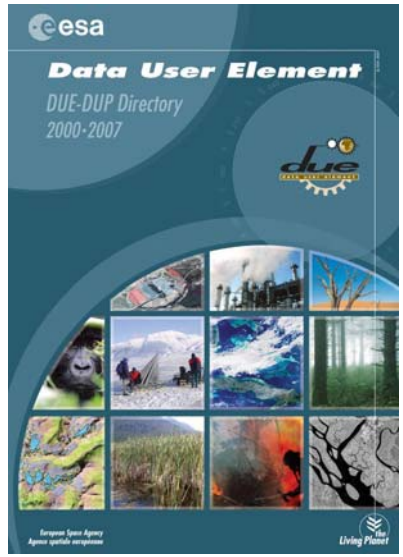
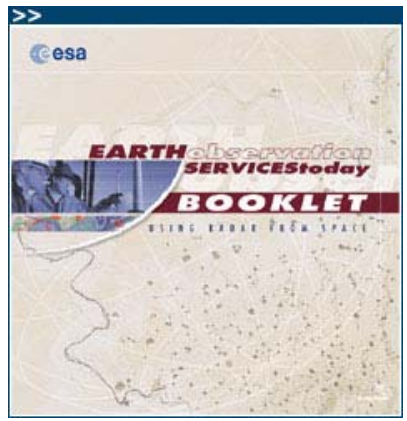
Further Information and Links

ESA	www.esa.int
GMES @ ESA	www.esa.int/gmes
GMES @ EC	www.gmes.info
EOPI Portal	eopi.esa.int
DUE	www.esa.int/due
EOMD	www.esa.int/eomd





frank.martin.seifert@esa.int